

## Appendix D: GLOSSARY

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<b>Absorbed Dose</b>	The energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest. The unit of absorbed dose is the radiation absorbed dose (rad).
<b>Absorption</b>	The passing of a substance into the circulatory system of the body. Also used specifically to refer to entry of toxicants through the skin. In radiological sciences, absorption is the imparting of some or all of the energy contained in ionizing radiation as it passes through matter.
<b>Activity</b>	The rate of decay of radioactive material, expressed as the average number of nuclear disintegration per second in a given quantity of radioactive material.
<b>Acute Exposure</b>	An exposure to a toxic substance which occurs in a short or single time period.
<b>Acute Radiation Syndrome</b>	A disease state that occurs in hours to months as damage caused by ionizing radiation to organs and tissues is expressed clinically. The disease is divided into 4 stages based on time. The first is the prodrome, followed by the latent, manifest illness and recovery/death stages (see below).
<b>Acute Toxicity</b>	Any poisonous effect produced by a single short-term exposure. The LD <sub>50</sub> of a substance (the lethal dose at which 50 percent of test animals succumb to the toxicity of the chemicals) is typically used as a measure of its acute toxicity.
<b>Additive Effect</b>	A biological response to exposure to multiple chemicals which is equal to the sum of the effects of the individual agents.
<b>Adsorption</b>	The bonding of chemicals to soil particles or other surfaces.
<b>Aerosol</b>	A solid particle or liquid droplet suspended in air. An aerosol is larger than a molecule and can be filtered from the air.
<b>Antagonism</b>	The situation in which two chemicals interfere with each other's actions, or one chemical interferes with the action of the other.

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<b>Alpha Particle</b>	A specific particle ejected spontaneously from the nucleus of some radioactive elements. It is identical to a helium nucleus (He; 2 protons and 2 neutrons), which has an atomic mass of 4 and an electrostatic charge of +2. It has low penetrating power and a short range. The most energetic alpha particle will generally fail to penetrate the skin. The danger occurs when matter containing alpha-emitting radionuclides are introduced into the body.
<b>Aquifer</b>	An underground bed, or layer, of earth, gravel, or porous storage that contains water.
<b>Asphyxiants</b>	Chemicals that deprive cells of an individual of oxygen needed to sustain metabolism.
<b>Atom</b>	The smallest particle of an element which cannot be divided or broken up by chemical means. It consists of a central core called the nucleus, which contains protons and neutrons. Electrons revolve in orbits around the nucleus.
<b>Atomic Number</b>	The number of protons in the nucleus of an atom. Each chemical element has its characteristic atomic number, and the atomic numbers of the known elements form a complete series from 1 (hydrogen) to 103 (lawrencium). Elements with atomic numbers 104 and 105 are presently unnamed.
<b>Background Radiation</b>	The radiation in the environment, including cosmic rays and radiation from the naturally radioactive elements, both outside and inside the bodies of animals and humans. It is also called natural radiation. Man-made sources of radioactivity contribute to total background radiation levels. Approximately 90 percent of the background radiation from man-made sources is related to the use of ionizing radiation in medicine and dentistry.
<b>Beta Particle</b>	A small particle ejected spontaneously from a nucleus of a radioactive element. It has the mass of an electron and has a charge of minus one. It has a medium or intermediate penetrating power and a range of up to a few meters in air. Beta particles will penetrate only a fraction of an inch of skin tissue, and is capable of damaging the skin.
<b>Biodegradable</b>	Capable of decomposing through the action of microorganisms.

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<b>Boiling Point</b>	The temperature at which a liquid will start to become a gas, and boil. A chemical with a low boiling point can boil and evaporate quickly. If a material that is flammable also has a low boiling point, a special fire hazard exists.
<b>Carcinogen</b>	A chemical or physical agent that is capable of causing a cell to undergo malignant transformation to a cancer cell.
<b>Central Nervous System Depressants</b>	Toxicants that depress the activity of the central nervous system (CNS), diminishing responsiveness and alertness.
<b>CERCLA</b>	The Comprehensive Environmental Response, Compensation, and Liability Act of 1980—the Federal statute that authorized “Superfund.” Administered by EPA, the law provides funding for cleanups and emergency response actions for hazardous substances at the worst hazardous waste sites in the United States. CERCLA is also significant because it set the first criteria for notification of emergencies involving hazardous substances.
<b>Charged Particle</b>	An elementary particle that carries a positive or negative electrical charge.
<b>CHEMTREC</b>	Chemical Transportation Emergency Center, a service operated by the Chemical Manufacturers Association to provide information and other assistance to emergency responders.
<b>Chronic Exposure</b>	Process by which small amounts of toxic substances are taken into the body over an extended period.
<b>Controlled Area</b>	An area where entry, activities, and exit are controlled to assure protection and prevent the spread of contamination.
<b>Corrosive</b>	A chemical that destroys or irreversibly alters living tissue by direct chemical action at the site of contact. Another name for acids.
<b>Cosmic Rays</b>	High-energy particulate and electromagnetic radiation which originate outside the earth’s atmosphere.
<b>Curie</b>	The basic measuring unit used to describe the amount of radioactivity in a sample of material. One curie is equal to 37 billion disintegrations per second. Symbol Ci.
<b>Decontamination</b>	The process of removing or neutralizing contaminants that have accumulated on personnel, structures, area, and equipment.

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<b>Dermal Exposure</b>	Exposure to toxic substances by entry through the skin.
<b>Detector</b>	A material or device that is sensitive to radiation and can produce a response signal suitable for measurement and analysis. A radiation detection instrument.
<b>Dose</b>	A general term for denoting the quantity of radiation or energy absorbed. If unqualified, it refers to absorbed dose. For special purposes, it must be appropriately qualified. If used to represent exposure expressed in roentgens, it is a measure of the total amount of ionization that the quantity of radiation could produce in air.
<b>Dose Equivalent</b>	A quantity of measurement used in radiation protection. This term expresses all forms of radiation on a common scale for evaluating and comparing the effects of radiation in man. It is defined as the product of absorbed dose in rads and certain modifying factors. The unit of dose equivalent is the rem.
<b>Dosimeter</b>	A small, pocket-sized device used for personnel monitoring of radiation exposure. Measures total radiation dose to which it was exposed, much as an odometer measures total miles traveled.
<b>Electromagnetic Radiation</b>	A traveling energy wave that results from changing electric and magnetic fields. Familiar electromagnetic radiations range from those of short wave lengths, like X-rays and gamma rays, through the ultraviolet, visible light, and infrared regions, to radar and radio waves of relatively long wavelengths.
<b>Electron</b>	An elementary particle with a negative electrical charge. Electrons surround the positively charged nucleus and determine the chemical properties of the atom.
<b>Evaporation Rate</b>	The rate at which a chemical changes into a vapor. A chemical that evaporates quickly can be a more dangerous fire or health hazard.
<b>Exercise</b>	A simulated emergency condition carried out for the purpose of testing and evaluating the readiness of a community or organization to handle a particular type of emergency.
<b>Explosive</b>	A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperatures.
<b>Exposure</b>	A quantity used to indicate the amount of ionization in air produced by beta or gamma radiation. The unit is the roentgen. For practical

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	purposes, one roentgen is comparable to 1 rad or 1 rem for gamma radiation.
<b>Extremely Hazardous Substance (EHS)</b>	Any one of over 300 hazardous chemicals on a list compiled by EPA to provide a focus for State and local emergency planning activities.
<b>Gamma Rays</b>	Electromagnetic radiation of high energy, originating from atomic nuclei. Gamma rays are identical to x-rays of high energy, the only essential difference being that x-rays do not originate from atomic nuclei but are produced in other ways; for instance, by slowing down fast, high-energy electrons. Gamma rays are the most penetrating type of radiation and represent the major external hazard.
<b>Geiger counter or G-M Meter</b>	An instrument used to detect and measure radiation. The detecting element is a gas-filled chamber operated by a voltage whose electrical discharge will spread over the entire anode when triggered by a primary ionizing event.
<b>Hazard Class</b>	A group of materials, as designated by the Department of Transportation, that share a common major hazardous property such as radioactivity or flammability.
<b>Hazardous Materials Response Team (HMRT)</b>	A team of specially trained personnel who respond to a hazardous materials incident. The team performs various response actions including assessment, firefighting, rescue, and containment; they are <b>not</b> responsible for cleanup operations following the incident.
<b>Incident Commander</b>	The person in charge of on-scene coordination of a response to an incident, usually a senior officer in a fire department.
<b>Inverse Square Law</b>	The relationship which states that the change in gamma radiation intensity is inversely proportional to the square of the change in distance from a point source.
<b>Inversion</b>	An atmospheric condition caused by a layer of warm air preventing cool air trapped beneath it from rising, thus holding down pollutants that could otherwise be dispersed.
<b>Ion</b>	Atomic particle, atom, or chemical radical bearing an electrical charge, either positive or negative.

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<b>Ionization</b>	The separation of a normally electrically neutral atom or molecule into electrically charged components. The term is also used to describe the degree or extent to which this separation occurs. Ionization is the removal of an electron (negative charge) from an atom or molecule, either directly or indirectly, leaving a positively charged ion. The separated electron and ion are referred to as an ion pair.
<b>Ionizing Radiation</b>	Electromagnetic radiation (x-ray and gamma ray photons) or particulate radiation capable of producing ions by direct or secondary processes.
<b>Irradiation</b>	Exposure to ionizing radiation.
<b>Irritant</b>	Chemicals which inflame living tissue by chemical action at the site of contact, causing pain or swelling.
<b>Isotope</b>	Forms of the same element having identical chemical properties, but differing in their atomic masses, due to different numbers of neutrons in their respective nuclei. For example, hydrogen has three isotopes, with one, two, and three atomic mass units. Each has one proton, and 0, 1, and 2 neutrons, respectively. H-1 is normal hydrogen, while H-2 and H-3 are commonly called deuterium and tritium, respectively. The first two of these are stable (nonradioactive), but the third, tritium, is a radioactive isotope.
<b>LD<sub>50</sub></b>	The calculated dosage of a material that would be fatal to 50% of an exposed population (Lethal Dose 50%).
<b>Leachate</b>	Material that pollutes water as it seeps through solid waste.
<b>Leaching</b>	The process by which water dissolves nutrient chemicals or contaminants and carries them away or moves them to a lower layer.
<b>LEPC</b>	Local Emergency Planning Committee.
<b>LOAEL</b>	The Lowest Observed Adverse Effect Level, i.e., the lowest dose which produces an observable adverse effect.
<b>Mass Number</b>	The sum of neutrons and protons in a nucleus, the mass number is the nearest whole number to an atom's atomic weight. For instance, the mass number for uranium-235 is 235.

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<b>Medium</b>	The environmental vehicle by which a pollutant is carried to the receptor (e.g., air, surface water, soil, or groundwater).
<b>Melting Point</b>	The temperature at which a solid material changes to a liquid. Solid materials with low melting points should not be stored in hot areas.
<b>Monitoring</b>	Periodic or continuous determination of the amount of ionizing radiation or radioactive contamination present for purposes of health protection.
<b>MSDS (Material Safety Data Sheet)</b>	A worksheet required by the U.S. Occupational Safety and Health Administration (OSHA) containing information about hazardous chemicals in the workplace. MSDSs are used to fulfill part of the hazardous chemical inventory reporting requirements under the Emergency Planning and Community Right-to-Know Act.
<b>Mutagen</b>	A chemical or physical agent that induces a permanent change in the genetic material.
<b>NOAEL</b>	No Observable Adverse Effect Level.
<b>Nucleus, Atomic</b>	The small, positively charged core of an atom. It is only about 1/100,000 diameter of an atom but contains nearly all of the atom's mass. All nuclei contain both protons and neutrons, except for the nucleus of ordinary hydrogen which consists of a single proton.
<b>Organic Compound</b>	Chemicals that contain carbon. Volatile organic compounds vaporize at room temperature and pressure. They are found in many indoor sources, including many common household products and building materials.
<b>OSHA</b>	The Occupational Safety and Health Administration, part of the Department of Labor.
<b>Pathway</b>	A history of the flow of a pollutant from source to receptor, including qualitative descriptions of emission type, transport, medium, and exposure route.
<b>PEL</b>	Permissible Exposure Limits set by OSHA as a guide to acceptable levels of chemical exposure.
<b>Poison</b>	A chemical that, in relatively small amounts, is able to produce injury by chemical action when it comes in contact with a susceptible tissue.

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<b>Proton</b>	An elementary particle with a single positive electrical charge. Protons are constituents of all nuclei. The atomic number of an atom is equal to the number of protons in its nucleus.
<b>Rad</b>	Radiation absorbed dose. A rad is the unit of absorbed dose. The rad is a measure of the energy imparted to matter by ionizing particles per unit mass of irradiated material at the place of interest. A rad is approximately equal to the absorbed dose in tissue when the exposure in air is one roentgen of medium-voltage gamma radiation.
<b>Radiation</b>	The propagation of energy through space or through a material medium as waves; for example, energy in the form of sound or electromagnetic waves. Radiation usually refers to electromagnetic radiation.
<b>Radiation Accident</b>	An accident in which there is an unintended exposure to ionizing radiation or radioactive contamination.
<b>Radioactivity</b>	The spontaneous emission of radiation, generally alpha or beta particles often accompanied by gamma rays, from the nucleus of an unstable atom. As a result of this emission, the radioactive atom is converted or decays into an atom of a different element that may or may not be radioactive.
<b>Rem</b>	Roentgen equivalent man - a special unit of radiation dose equivalent. The dose equivalent in rems is numerically equal to the absorbed dose multiplied by the quality factor, the distribution factor, and any necessary modifying factors.
<b>Risk Assessment</b>	<p>Broadly defined as the scientific activity of evaluating the toxic properties of a chemical and the conditions of human exposure to it, with the objective of determining the probability that exposed humans will be adversely affected. Its four main components are:</p> <ol style="list-style-type: none"><li>1. <b>Hazard Identification</b>--Does the agent cause the effect?</li><li>2. <b>Dose-Response Assessment</b>--What is the relationship between the dose and its incidence in human beings?</li><li>3. <b>Exposure Assessment</b>--What exposures are experienced or anticipated, and under what conditions?</li><li>4. <b>Risk Characterization</b>--The total analysis producing an estimate of the incidence of the adverse effect in a given population.</li></ol>
<b>Roentgen</b>	The unit of exposure for x- or gamma radiation in air.



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<b>Runoff</b>	Water from rain, snow melt, or irrigation that flows over the ground surface and returns to streams.
<b>SARA</b>	Superfund Amendments and Reauthorization Act of 1986.
<b>Sealed Source</b>	A radioactive source, sealed in an impervious container, which has sufficient mechanical strength to prevent contact with and dispersion of the radioactive material under the conditions of use and wear for which it was designed.
<b>Solubility in Water</b>	An indicator of the amount of a chemical that can be dissolved in water, shown as a percentage or as a description. A low percent of solubility (or a description of "slight" solubility or "low" solubility) means that only a small amount will dissolve in water. Knowing this may help firefighters or personnel cleaning a spill.
<b>Specific Gravity</b>	A comparison of the weight of the chemical to the weight of an equal volume of water. Chemicals with a specific gravity of less than 1 are lighter than water, while a specific gravity of more than 1 means the chemical is heavier than water. Most flammable liquids are lighter than water.
<b>Survey Instrument</b>	A portable instrument used for detecting and measuring radiation under varied physical conditions. The term covers a wide range of devices.
<b>Synergistic Effect</b>	A biological response to exposure to multiple chemicals which is greater than the sum of the effects of the individual agents.
<b>Systemic Toxicants</b>	Chemical compounds that affect entire organ systems, often operating far from the original site of entry.
<b>Title III</b>	The third part of SARA, also known as the Emergency Planning and Community Right-to-Know Act of 1986.
<b>Toxicity</b>	The degree of danger posed by a substance to animal or plant life.
<b>Toxicology</b>	The study of the adverse effects of chemicals on biological systems, and the assessment of the probability of their occurrence.
<b>Transformation</b>	The chemical alteration of a compound by processes such as reaction with other compounds or breakdown into component elements.
<b>Transport</b>	Hydrological, atmospheric, or other physical processes that convey pollutants through and across media from source to receptor.

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<b>Vapor Density</b>	The measure of the heaviness of a chemical's vapor as compared to the weight of a similar amount of air. A vapor density of 1.0 is equal to air. Vapors that are heavier than air may build up in low-lying areas, such as along floors, in sewers, or in elevator shafts. Vapors that are lighter than air rise and may collect near the ceiling.
<b>Vapor Pressure</b>	The measure of how quickly a chemical liquid will evaporate. Chemicals with low boiling points have high vapor pressures. If a chemical with a high vapor pressure spills, there is an increased risk of explosion and a greater risk that workers will inhale toxic fumes.
<b>Volatilization</b>	Entry of contaminants into the atmosphere by evaporation from soil or water.
<b>Whole-body (total) exposure</b>	An exposure of the body to external radiation, where the entire body rather than an isolated part is irradiated. When a radioactive material is uniformly distributed throughout the body tissues rather than being concentrated in certain organs, the irradiation can be considered whole-body exposure.